



US009410721B2

(12) **United States Patent**
Cravens

(10) **Patent No.:** **US 9,410,721 B2**
(45) **Date of Patent:** ***Aug. 9, 2016**

(54) **CERAMIC HEATING ELEMENT**

C04B 2235/3215 (2013.01); *C04B 2235/3229*
(2013.01); *C04B 2235/94* (2013.01); *H01M*
4/9066 (2013.01)

(71) Applicant: **Brown-Cravens-Taylor**, Sebastopol, CA
(US)

(72) Inventor: **Dennis Cravens**, Cloudercroft, NM (US)

(73) Assignee: **Brown Cravens Taylor**, Sebastopol, CA
(US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 37 days.
This patent is subject to a terminal dis-
claimer.

(58) **Field of Classification Search**
CPC F04B 37/02; H02K 44/02; H02K 44/04;
F24J 1/00
USPC 429/434, 523; 417/48–50
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,150,483 A * 9/1964 Mayfield et al. 60/202
4,023,065 A * 5/1977 Koloc 376/144

(Continued)

(21) Appl. No.: **13/920,358**

(22) Filed: **Jun. 18, 2013**

(65) **Prior Publication Data**

US 2013/0276770 A1 Oct. 24, 2013

FOREIGN PATENT DOCUMENTS

EP 1785999 5/2007

OTHER PUBLICATIONS

Cravens, D. Factors Affecting the Success Rate of Heat Generation of
CF Cells, Fourth International Conference on Cold Fusion. 1993.
Lahaina, Maui: Electric Power Research Institute.

(Continued)

Related U.S. Application Data

(63) Continuation of application No. 12/872,750, filed on
Aug. 31, 2010, now Pat. No. 8,485,791.

(60) Provisional application No. 61/238,587, filed on Aug.
31, 2009.

(51) **Int. Cl.**

F24J 1/00 (2006.01)

F04B 37/02 (2006.01)

H02K 44/00 (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **F24J 1/00** (2013.01); **C04B 35/486**
(2013.01); **F04B 37/02** (2013.01); **H01M**
8/1213 (2013.01); **H02K 44/00** (2013.01);
H02K 44/04 (2013.01); **C04B 35/50** (2013.01);

Primary Examiner — Alexander Comley

(74) *Attorney, Agent, or Firm* — Fish & Tsang LLP

(57)

ABSTRACT

A heating element that includes a ceramic material doped
with various elements is described. The heating element can
be heated by forcing a fuel to flow through the ceramic mate-
rial, where the fuel interacts with the dopants. The interaction
can produce energy in the form of heat. Inventive aspects of
the present material include apparatus and methods for modu-
lation of the heat energy, physical features providing for an
increase in the rate of heat release, optimization of materials
and material morphology for quantity and efficiency of heat
release and provision for fueling and maintenance.

14 Claims, 3 Drawing Sheets

